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ABSTRACT

An investigation to determine whether reading disabled children exhibit deviant oral language behaviors was undertaken in a study of 103 children in second, fourth, and sixth grades (in two groups, one reading disabled, one control). Four dependent measures (Developmental Sentence Scoring, Mean Length of Utterance, Type Token Ratio, and verbal prompts used to obtain a language sample of 50 or more utterances) and four independent variables (group membership, grade level, sex, and ethnicity) were analyzed. Among findings were that sex was a significant factor, with females scoring higher on morphological and grammatical/syntactical measures, and that group membership accounted for 15% of the variance in scores in the four dependent measures. Grade level and ethnicity were not significant factors. (PHR)

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Oral Language Responses of Children with Reading Difficulties

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This investigation was designed to determine whether reading disabled children exhibit deviant oral language behaviors. It is conceivable that educators, parents, diagnosticians, school psychologists, and others attend more to the content of what children are saying, rather than how children are expressing themselves verbally. The intent of this study was to investigate whether the content of oral language samples differed between reading disabled children and normally achieving children. The differences were examined in terms of acquisition of grammar, syntax, word-type variability, sentence length and readiness to respond to questions.

The oral language performance of reading disabled children needs to be more specifically pin-pointed and analyzed. Then it will be possible to determine whether poor reading is a secondary characteristic of a more primary language deficit. An important diagnostic consideration would be to develop a systematic plan for analyzing the total language of the child with reading difficulty.

Linguistic methods have seldom been applied to evaluation of language function in children with reading disabilities, although some theorists (Bouchard, 1974; Goodman, 1976; Lee, 1966; Menyuk, 1977; Wanat, 1968, 1972, 1976a, 1976b, 1977) have taken the position that a relationship does exist between linguistic competencies and the ability to read. In essence, reading is a form of language. Therefore, a relationship should exist between oral language skills and reading ability. The theory has been posited that a reader's knowledge of language structure plays a central role in guiding a search of the text (Wanat, 1968, 1972, 1976a, 1976b, 1977). A massive review of the reading research literature concluded that "the reading problem" in the United

States is not explainable in terms of the ability to learn grapheme-phoneme correspondences. Rather it has to do with the difficulties that people have in comprehending spoken, as well as written messages (Corder, 1971).

The Relationship Between Language Skills and Reading

Anecdotal reports have described the learning disabled child as possessing receptive and expressive language problems (Orton, 1937; Myklebust, 1965). During the past decade, research has provided evidence that children with learning disabilities possess more deficits in receptive and expressive langauge than had previously been assumed (McGrady & Olson, 1970; Meier, 1971; Rosenthal, 1970; Wiig, Semel & Crouse, 1973; Wiig & Semel, 1973, 1974).

Speech Problems and Reading

Speech problems in reading disabled children have been recognized by European investigators (de Ajuiaguerra, Antonini, Besson, Boitel, Duvernay, Maquard, Menthonnex, Roth & Zwahlen, 1968). These reports include some children with poorly developed speech. Delayed speech and language development have been found in retarded readers (Rutter, Yule, Tizard & Graham, 1966; Warrington, 1967). Preliminary findings suggested that preschool children who are delayed in their speech development frequently have considerable difficulty learning to read when they start school (Ingram, 1963; Mason, 1967; Tranthan & Pedersen, 1976).

Language Comprehension and Reading

Language comprehension may be related to reading skills. A possible relationship between auditory discrimination and language has been indicated (Doehring & Rabinovitch, 1969; Monsees, 1968). In

further support, ability to comprehend sentences has been reported to be related to ability to read (Gibbons, 1941; McGrady & Olson, 1970; Wiig & Semel, 1973, 1974).

Expressive Language Skills and Learning Difficulties

Expressive language skills in the child with learning problems has been considered. Performance discrepancies have been observed in sentence completion and formulation (Rosenthal, 1970), word discrimination and articulation (Newcomer & Hammill, 1978), morphological usage (Vogel, 1976, 1977; Wiig, Semel & Crouse, 1973) and syntax, grammar and phrase length (Wiig, Lapointe & Semel, 1977; Wiig and Semel, 1975).

Previous studies in reading disabilities have indicated the possibility of deficiencies or immaturities in oral syntax accompanying but secondary to reading difficulty (Dohring, 1968; Ingram, 1960; Johnson and Myklebust, 1967; Ravinovitch, Draw, DeJong, Ingram & Withey, 1954; Zangwill, 1960).

Some children with language disorders have deficiences in syntactical structure repetition (Menuuk, 1972) as well as in learning syntactical rules (Liles, Shulman & Bartlett, 1977; Morehead and Ingram, 1973). Similar syntactical deficiencies have been observed in some children with reading disability (Guthrie, 1973; Semel & Wiig, 1975; Vogel, 1974; Weaver, 1978; Weinstein and Rabinovitch, 1971).

METHOD

Populations Studied and Sampling Procedures

This multivariate study included four dependent measures, four independent measures and two covariates. A total sample of 103 children were randomly selected from the Santa Fe, New Mexico Public

School District. The district is comprised of sixteen elementary schools. In total, twelve samples of subjects were selected using a table of random numbers. These six sampling categories were: male second graders, female second graders, male fourth graders, female fourth graders, male sixth graders, and female sixth graders. Each of the preceding categories were selected for both the reading disabled group and the control group. Randomization procedures were followed with the above restrictions included. Sampling with replacement was used in order to yield homogeneous samples.

Subjects

The control group. To determine the control sample, 59 children were randomly selected from the school district attendance roster to obtain a group distinct from the reading disabled group. Children placed in special education classes, Title I Reading programs, or bilingual classrooms were deleted from the list, prior to selection.

The control subjects were selected within a grade stratification design. Nineteen subjects were selected from the second grade (mean age 8.0), twenty subjects selected from the fourth grade (mean age 9.4), and twenty subjects from the sixth grade (mean age 11.9). Each group contained ten female and ten male subjects. The subjects were reading at no more than one year below the grade level in which they were placed. There were 36 subjects of Spanish-American parentage, 17 from Anglo-American parentage and six from Spanish/Anglo-American origin.

The reading disabled group. To obtain a sample of reading disabled children, 44 children were randomly selected from membership lists of children placed in resource rooms for instruction in reading.

Fifteen children were selected from the second grade (mean age 8.5), 12 from the fourth grade (mean age 10.3), and 17 from the sixth grade (mean age 12.8). There were 21 females and 23 males. There were 35 Spanish-American subjects, six Anglo-American subjects and three subjects of Spanish/Anglo-American origin.

Subjects were considered if they were placed in a resource room for special instruction in reading. The New Mexico State Regulations for Special Education (1978) definition for a learning disability manifested by reading difficulty was then applied. A child was considered a member of the reading disabled group if the reading scores from a standardized test were in the lower tenth percentile or the child was performing two years or more below the expected grade level in reading on a standardized reading test. Expected grade level was the match between the child's age and the number of years in school.

Procedures

Testing Subjects

Each subject was asked a series of eight questions in order to obtain a minimum of 50 utterances. A supplementary set of questions was used for children who did not produce 50 utterances from the first set of questions. The Raven Progressive Matrices was also given to each subject.

Part A in Table 1 illustrates the eight questions that were asked of every subject. Part B in the same table contains the alternative set of questions asked if the child failed to emit a minimum of 50 utterances.

Continuous measurement of the total number of examiner-prompts given during the session was also recorded. Each language sample was recorded on a tape recorder and was transcribed at a later date.

Insert Table 1

Data Quantification

Transcription. All recognizable English words were transcribed into conventional orthography. Dialectical variations in pronunciation were ignored; vowels or consonants omitted in pronunciation were replaced in transcription (Wepman & Hass, 1969). The number of verbal prompts from the examiner was also recorded to verify the continuous measurement of these prompts that were recorded during the session.

Language sample selection. Upon transcription of the language sample, 50 utterances in sequence, omitting single word responses or repeated phrases, were selected. These 50 utterances were selected from the beginning section of each language sample. It has been recommended (Lee, 1974) that this 50-word utterance be selected from the most verbose section of each language sample. However, some subjects had a maximum of 50 utterances. For this reason, the first 50 utterances for each subject were analyzed. These utterances began in response to the first question asked. These questions were asked after an initial warm-up session between the researcher and the subject.

Scoring. The Developmental Sentence Scoring (DSS) and the Mean Length of Utterance (MLU) were scored by hand. After scoring was completed a reliability check was applied. Eighteen language samples were randomly selected for analysis.

The reliability coefficients for the DSS for scores calculated by the researcher as compared to those calculated by an untrained examiner

were: $r = .93, R^2 = .86, p < .001$. The two sets of scores share 86 percent of the variance. The scoring technique is highly reliable.

The reliability coefficients for the MLU between original score assignment and that calculated for reliability were: $r = .97, R^2 = .94, p < .001$. The two sets of scores share 94 percent of the variance. Again, this scoring technique is highly reliable.

In order to score the TTR, all language samples were typed onto a computer storage system. Then, the data were submitted to a word counting program (Butt, 1978). The Type-Token Ratio was computed for each sample with a hand calculator. The total number of different words used was divided by the total number of words in the sample. Reliability checks for the TTR consisted of two stages: (1) calculating each TTR twice in succession or until 100% agreement was reached between calculations, and (2) randomly selecting two language samples and hand counting the total number of words and different words. The computer reports proved to be 100% accurate on these selected samples.

Instruments

Dependent Measures

Four dependent variables were measured: the Developmental Sentence Scoring (DSS) (Lee, 1974), a Mean Length of Utterance (MLU) (Brown, 1973) the Type-Token Ratio (TTR) (Johnson, 1944), and the number of verbal prompts used to obtain a language sample of at least 50 utterances.

First dependent measure - DSS. The Developmental Sentence Scoring (DSS) is a clinical instrument designed to analyze the oral language system (Lee, 1974). The DSS evaluates a child's use of grammatical rules in spontaneous speech. The child's grammar is measured against adult "standard" English (Lee & Canter, 1971).

Second dependent measure - MLU. The Mean Length of Utterance (MLU) is a measurement of average utterance length (Brown, 1973). The number of morphemes in each of the selected sentences in the language sample are counted. The average number of morphemes per sentence in each sample yields the MLU. The MLU is a raw score. Compilation of standards used in determining how morphemes are counted (Butt & Rechnitz, 1978) was the guide used to determine morphemes.

Third dependent measure - TTR. The Type-Token Ratio (TTR) is a type of frequency count used to measure vocabulary diversity. It was initially formulated by Johnson (1944), who described it as a measure of vocabulary "flexibility" or variability designed to indicate certain aspects of language adequacy. The TTR for a given oral language sample is equal to the number of different words (types) divided by the number of total words in the sample words (token) (Cazden, 1972; Spradlin, Karlan & Wetherby, 1976). Each subject is assigned a single ratio score.

Additional analysis for parts of speech. Regardless of whether or not the Type-Token Ratio reflected a difference in the variability of speech between the experimental and control groups, further analysis was necessary to glean more specific information. In order to accomplish this the following word classification system was used for separating words into grammatical categories (Jones, Goodman, & Wepman, 1963): 1) noun, 2) verb, 3) adjective, 4) adverb, 5) pronoun, 6) relative, 7) article, 8) indefinite, 9) auxiliary, 10) quantifier, 11) preposition, 12) conjunction, 13) interjection, and 14) unclassified. All of the words contained within each 50 utterance language sample were

assigned to one of the above listed categories. A percentage score reflecting proportion of usage was assigned to each part of speech for every subject.

Fourth dependent measure - Verbal Prompts. In order to reflect the responsiveness of each subject to oral language usage the number of verbal prompts was counted. This is a raw score. Verbal prompts were defined as the number of times the investigator had to verbally "urge" the subject to talk when the subject failed to respond to stimulus questions. This total number was excluding the set of stimulus questions used to elicit the initial response. Examples of verbal prompts are: "Tell me more," "Then, what happened?," and "And, then?" Continuous measurement of the number of verbal prompts was recorded by the examiner. This data collection occurred while the 50 utterance language sample was being recorded.

Independent Measures

The following influencing variables were tested for effects by use of a multivariate statistical design: 1) group membership, 2) grade level, 3) sex, and 4) ethnic group membership. Group membership was comprised of the reading disabled group and a control group. Grade level consisted of second, fourth and sixth grades. Ethnic group membership was divided into three categories: Spanish-American, Anglo-American and mixed Anglo/Spanish-American origin.

Covariates

Nonverbal problem solving ability. The effects of nonverbal problem solving ability was treated as a covariate. This was measured by administration of the Raven Progressive Matrices (Raven, 1965). This is a series of puzzle problems presented on a one dimensional plane. The

child must interpret a sequence of pattern changes for each puzzle and supply the missing piece. This is selected from an array of choices. If the child correctly solves the first set of puzzles, there is not an interaction with visual spatial difficulties. No child demonstrated this difficulty.

Socioeconomic status. Socioeconomic level was determined by the Duncan's Socioeconomic Index (Reiss, Duncan, Hatt and North, 1961). In families where both parents were employed, the higher occupational rating was used.

RESULTS

Intercorrelations of Dependent Measures and Covariates

The correlation between all of the dependent measures and the covariates is reported in Table 2. Removing the effects of nonverbal problem solving ability and socioeconomic status had relatively little effect upon the correlations between the dependent measures. This lack of effect is illustrated by comparing Table 2 to Table 3.

Insert Tables 2 and 3

Multivariate Analysis of Covariance

Four dependent measures (DSS, MLU, TTR, verbal prompts) and four factors or independent variables were entered into a multiple analysis of covariance equation. The four factors were group membership, grade level, sex, and ethnicity. The covariates were nonverbal problem solving ability and socioeconomic status.

Covariates. The covariate effects of nonverbal problem solving ability and socioeconomic status were considered first. Regression

analyses yielded an F-ratio for each dependent measure. Tables 4 and 5 contain the statistics for these results. When the individual effects of nonverbal problem solving ability and socioeconomic level were considered, they were found to have no significant effect upon any of the dependent measures. In summary, the dependent measures were not seriously affected by a subject's ability to solve problems using no language. Likewise, socioeconomic status had little or no effect upon the same dependent measures.

Insert Tables 4 and 5

Main Effects

A main effects model was used to determine the effects of the four factors. With this type of analysis, the general form of estimable functions may be manipulated to provide tests of hypotheses involving only the parameters of the effect in question. This analysis of unique contribution of each variable is particularly important when there is fluctuation of the number of subjects within each cell of a given factor.

The overall results of the multivariate analysis of covariance are reported in Table 6. When all four dependent measures were considered, there were two independent variables that had a significant effect upon the dependent variables: group membership (F (4,71) = 3.24, $p < .0169$) and sex (F (4,71) = 4.10, $p < .0048$). There were no signficant multivariate differences between the scores of subjects for Spanish-American, Anglo-American or Spanish/Anglo-American origin. Neither were any of the first order, second order or third order interactions significant.

For the group membership with two levels, there was one greatest characteristic root (gcr = .1824) which was significant. Group membership accounted for fifteen percent of the variance in scores in the four dependent measures (0 = .1543).

For sex, with two levels, there was also one greatest characteristic root (gcr = .2308) which was significant. Sex accounted for nineteen percent of the variation in scores on the four dependent measures (0 = .1875). Each of these two significant variables, group membership and sex, accounted for unique variance. Threfore, the combined variance attriubuted to group membership and sex was thirty-five percent of the variance in the dependent variables.

Insert Table 6 here

The Standardized Value of the Discriminant Function Coefficients

When the predictor variable group membership was considered, the multivariate results of the contribution of the dependent measures was observed univariately. The standardized value of each discriminant function coefficient was considered. The MLU (sdfc = .77), the TTR (sdfc = .65), and the number of verbal prompts (sdfc -.43) contributed to the separation of the scores for group membership. Numerical values of less than .30 were not considered (Harris, 1975).

The lack of significant weight contribution by the DSS is due to the high correlation (r = .70) between the DSS and the MLU. Once the variance of the MLU has been accounted for, the DSS accounts for any remaining unique variance. To verify this, the above multiple analysis of covariance was conducted with the MLU deleted as a dependent

measure. With the MLU removed the relative weights of the standardized discriminant function coefficients for the remaining three dependent measures were examined. The standardized discriminant function coefficients larger than .30 were the DSS (sdfc = .70), the number of verbal prompts (sdfc = -.66), and the TTR (sdfc = .62).

With sex as the predictor variable, the TTR (sdfc = .83), the number of verbal prompts (sdfc = -.43) and the MLU (sdfc = -.36) contributed to the separation of females from males. Once again, this was due to the high correlation with the MLU. With the MLU removed from the analysis, the weight contributions were the TTR (sdfc = .91), the DSS (sdfc = -.40), and the number of verbal prompts (sdfc = -.37).

The Direction of the Standardized Discriminant Function Coefficients

For group membership, the positive diections of the MLU, the TTR, and the DSS indicated that the lower the raw score, the more likely the subject was to be a member of the reading disabled group. The negative direction of the number of verbal prompts indicated that higher scores were associated with members of the reading disabled group.

For sex, the negative directions of the DSS, the MLU, and the number of verbal prompts indicated that higher scores were associated with females. The positive direction of the TTR indicated that higher scores were more likely associated with males.

Univariate Analysis

The separate effects of each of the dependent variables has been included to illustrate that differences may occur between univariate and multivariate results. The multivariate effects are essential to describe results. The univariate effects are merely useful to aid in understanding separate effects of each dependent measure.

The DSS was a significant univariate dependent measure (F (28,74) = 4.44, $p < .0385$) for group membership. The mean scores of the DSS were higher for the control group ($\bar{X}$ = 7.51) than for the reading disabled group ($\bar{X}$ = 6.99)

The MLU was also a dependent measure that was significant univariately within an analysis of covariance model (F (28,74) = 7.81, $p < .0066$) when group membership was considered. The mean scores of the MLU were higher for the control group ($\bar{X}$ = 8.50) than for the reading disabled group ($\bar{X}$ = 7.72). The means for group membership on all dependent measures are reported in Table 7.

Insert Table 7 here

Univariately, the DSS was a significant dependent measure (F (28,74) = 4.42, $p < .0389$) when sex was considered as a factor. The mean scores of the DSS were higher for females ($\bar{X}$ = 7.50) than for males ($\bar{X}$ = 7.08).

The MLU was also a significant univariate dependent measure (F (28,74) = 6.32, $p < .0141$) when sex was a factor. The MLU mean scores were higher for females ($\bar{X}$ = 8.44) than for males ($\bar{X}$ = 7.90).

The TTR was also a significant univariate dependent measure (F (28,74) = 12.01, $p < .0009$) when sex was a factor. The overall TTR F-ratio was not significant. The TTR mean scores were lower for females ($\bar{X}$ = .44) than for males ($\bar{X}$ = .48). The means for sex on all dependent measures are reported in Table 8.

Insert Table 8 here

Analysis of Parts of Speech

Multiple comparisons were made by use of the two-tailed *t* statistic (Nie, Hull, Jenkins, Steinbrenner & Bent, 1975). The independent variable was group membership. The comparisons were made for every part of speech. To hold the experiment-wise alpha at .05, the comparison-wise alpha was obtained by dividing .05 by the number of dependent variables (Kirk, 1968). Thus, the corrected level of significance used was $p < .004$ (.05/14).

Out of fourteen parts of speech comparisons between the reading disabled group and the control group, only two parts of speech were significantly different ($p < .004$). These were the use of adverbs and the use of auxiliary verbs. Significantly more adverbs were used by the control group than by the reading disabled group, t (93.77) = -5.09, $p < .0001$. However, referral to actual mean percentages indicates that there is less than a two percent difference between the groups: reading disabled group ($\bar{X}$ = 2.65) and control group ($\bar{X}$ = 4.29). Significantly more auxiliary verbs, t (101) = 3.77, $p < .0001$, were used by the reading disabled group ($\bar{X}$ = .0760, SD = .026) than by the control group ($\bar{X}$ = .0507, SD = .039). Again, the actual mean percentage difference is approximately two and one-half percent: reading disabled group ($\bar{X}$ = 7.65) and control group ($\bar{X}$ = 5.07).

Table 9 is a report of the mean percentage use of the fourteen parts of speech by the reading disabled group and the control group. The contents of the table reflect how closely the two groups matched in their use of the various parts of speech. The adverbial and auxiliary verb differences are noted.

Insert Table 9 here

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DISCUSSION

The assessment devices in this research investigation, with the exception of verbal prompts, were developed as clinical measures. They are based upon the oral language production of preschool-aged children. The results of this study demonstrate that these measures can be used to analyze language deficits of children with reading difficulty.

Covariate Effects

The effects of nonverbal problem solving ability and socioeconomic status were considered prior to any statistical analysis for differences between a reading disabled group and children attending regular classes on a full-time basis. Neither nonverbal problem solving ability nor socioeconomic status were observed to have a significant effect upon the subjects' performance on the DSS, the MLU, the TTR and the number of verbal prompts. The lack of relationship between the language measures (DSS, MLU, TTR) and ability to solve puzzle problems presented on a one-dimensional plane, as in the Raven Progressive Matrices, may have some neuropsychological significance. Specific brain hemispheric function is related to language and nonlanguage information processing. (Geschwind & Levitsky, 1968; Kimura, 1973; Luria, 1970; Molfese, 1972; Osgood & Miron, 1963). For the children in this study it is possible that the nonverbal problem solving task was accomplished in the nondominant hemisphere (usually the right one). The oral language skills were probably processed in the dominant hemisphere (usually the left one). This would support the lack of correlation between the scores on nonverbal problem solving ability and the scores for oral language skills. It is also possible that the two measures are not related to each other.

The nonverbal problem solving ability scores were not significantly different between the reading disabled group and the control group. This observation could lend support to reports that some learning disabled children score lower on verbal abilities than on performance abilities on intelligence tests (Ackerman, 1971; Bell, Lewis & Anderson, 1972; Rutter, Tizand & Whitmore, 1970; Smith, Coleman & Dokecki, 1977; Warrington, 1967). When words were not used to solve problems, group score differentiation did not occur with the subjects in the present research investigation.

The lack of impact of socioeconomic status upon the language measures is equally important. This result implies that certain children, regardless of the socioeconomic background in which they are reared, have difficulty with linguistic concepts. It may be that there are comparable proportions of children who have language and reading difficulties within all socioeconomic stratifications.

Not only did these covariates, nonverbal problem solving ability and socioeconomic status, have little relationship to language but the relationship between them is negligible. Their low correlation indicates that for the subjects in this study, solving problems without words (Raven Progressive Matrices) had little relation to the socioeconomic status of the families of the subjects.

Multiviariate Results

A multivariate analysis of covariance allowed the researcher to consider more than one dependent measure simultaneously. When the DSS, the MLU, the TTR and the number of prompts were entered into a multiple equation, two predictor variables were found to be effective: group membership and sex.

Group Differences

The scores on all four dependent measures were different for the reading disabled group than for the control group when all four dependent measures were considered simultaneously. Univariately, the reading disabled group had lower grammatical/syntactical scores (DSS) and used fewer morphemes per utterance (MLU).

However, a multivariate analysis revealed that all four dependent measures were important. If discriminant function coefficients were used to predict group membership, then there was a distinct alteration in the importance of each of the dependent measures. The MLU, the TTR, and the number of verbal prompts contributed to the separation between the reading disabled and the control group. The DSS contributed little additional influence to the separation of scores between the groups. However, this was demonstrated to be due to the high correlation between the DSS and the MLU. Both measures are designed to reflect grammatical/syntactical development. When the DSS was considered in combination with the TTR and the number of verbal prompts, it contributed to the separation of the reading disabled group from the control group.

These results support the position taken by some theorists (Bouchard, 1974; Goodman, 1976; Menyuk, 1977; Wanat, 1968, 1972, 1976a, 1976b) that a relationship exists between linguistic competencies and the ability to read. In addition, these findings are in support of Kimura (1973) who demonstrated a cerebral hemispheric relationship between visual and linguistic processing.

Syntactical and grammatical differences observed in children with learning problems (Wiig, Lapointe & Semel, 1977; Wiig and Semel, 1975)

and especially in children with reading problems (Guthrie, 1973; Semel and Wiig, 1975; Vogel, 1974, 1976, 1977; Weaver, 1978; Weinstein & Rabinovitch, 1971) can be further substantiated by the results of this investigation

Sex Differences

Sex was a significant multivariate factor. When each of the dependent measures were considered alone some sex differences were reported. Females had higher grammatical/syntactical scores (DSS) and used more morphemes per utterance (MLU). Sex differences in scores on the TTR indicated that males used slightly more variety of words than did females.

Again, there was a difference when the effects of all four dependent measures were considered simultaneously. The TTR, the MLU and the number of verbal prompts contributed significantly to differences between males and females. The value of the DSS was too small to be considered (sdfc $<$ .30). But, once again, it is important to reiterate that the high intercorrelation scores between the DSS and MLU as compared to the two intercorrelation scores of each of these two measures to the TTR and the number of verbal prompts is the reason for this discriminant function coefficient weight difference. With the effects of the MLU removed the DSS was an important measure for group separation.

Effects of Grade Level

Contrary to what could be posited from a developmental point of view, there were no distinct differences between the reading disabled group and the control group according to what grade they were in. A developmental theory would predict that the linguistic differences

between the two groups might disappear as the grade level increases. For instance, by the time a child is enrolled in sixth grade, a developmental theory might predict that any earlier linguistic deficits observed in a reading disabled child would be overcome. The results of this investigation indicated that this position cannot be supported for the subjects in this study. There were no significant group by grade level differences when the four dependent measures were considered simultaneously.

Wiig, Lapointe and Semel (1977) reported that learning disabled adolescents reached a performance plateau and no longer produced an increase in linguistic abilities. The findings of the present study support this observation for the second, fourth and sixth graders who were studied. The effect of grade level was not found to influence group differences. The reading disabled group performed differently than the control group across grade levels.

Effects of Ethnicity

In a similar fashion, the effects of ethnicity were not significant upon the outcome (dependent measures) when all measures were considered simultaneously. An important reservation is that the ratio between subjects from Spanish origin to those of Anglo origin was 3:1. It is possible that there were not enough subjects of Anglo origin to properly compare the two groups. A future research study needs to be conducted that is stratified by ethnic group. The effects of other ethnic groups also needs to be considered.

Analysis of Speech Parts

Fourteen parts of speech were analyzed to determine the relationship between a subject's use of a given speech part as compared to the

total number of words used within a 50-utterance language sample. Two parts of speech were used differently by the reading disabled and the control group. The reading disabled subjects used one and one-half percent fewer adverbs and two and one-half percent more auxiliary verbs than did the control group. This specific analysis of type of parts of speech has not been previously applied to language samples of reading disabled children in comparison to a control group. Even though production of adverbs and auxiliary verbs were significantly different between the groups, the actual differences of percentage of the total sample were small. Overall, utilization of parts of speech reflected little difference between the subjects in this study.

Model for Assessment

A research study such as this can lay the groundwork for the development of a linguistic assessment model. Such a model can be used to determine whether a given student with reading problems also exhibits difficulties in formulation of words and the order of those words in oral language usage. The utilization of the Mean Length of Utterance, the Type-Token Ratio, the Number of Verbal Prompts and the Developmental Sentence Scoring as measures of linguistic ability can be employed by the special educator, regular educator, or the diagnostician as assessment tools.

These measures can be readily utilized because of the level of simplicity associated with their use. The evaluator is required to talk with a child and record his/her verbalizations. Transcript recording and analysis can be conducted at a later time. The scores of a student on any of the four measures can be compared to the mean score for the reading disabled group in this study and in future replication studies.

Lowered scores on the MLU, TTR and DSS and higher scores on the Number of Verbal Prompts indicate that the student is more like the reading disabled group than her/his counterpart in the regular classroom. Use of the standardized discriminant function coefficients can be coupled with each raw score to predict group membership for reading disability or for sex.

Each measure provides a wealth of information that is available to an examiner. If a student has a lower score on the DSS, the examiner can assess precisely which grammatical/syntactical construct the student has not acquired. Errors in morphology usage can be analyzed while computing the MLU score. As an extension of the TTR, an indepth analysis of the parts of speech used by the student can reveal which parts are deficient. If it is determined that a reading disabled student has a deficient oral language system, then the special educator or regular educator can develop education programs designed to improve the deficit.

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TABLE 1 Part A: The Sequence of Stimuli Probes Asked of Each Subject

1. Tell me about your family.
2. Tell me about your house.
3. Tell me about every room in your house. What do they look like?
4. What do you like to eat best? How do you make it?
5. How do you play hide 'n seek?
6. What is your favorite subject in school? If you were the teacher, how would you teach it?
7. Tell me about a funny/scary movie you saw on television or at the movies.
8. If you were playing by a ditch and a big flood came, what would you do?

Part B: The Sequence of Alternative Probes Used to Increase the Size of a Language Sample

1. Tell me about the best/worst dream you ever had.
2. What's your favorite game? How do you play it?
3. Where is your room in this school? What does it look like?
4. How do you get to the cafeteria from here? to the playground?

TABLE 2: The Intercorrelation Matrix Among the Dependent Variables and the Covariates

N = 120	DSS	MLU	TTR	Prompts	Prb Slv (Covariate)	SES (Covariate)
DSS	1.00					
MLU	.70	1.00				
TTR	-.20	-.35	1.00			
Prompts	-.12	-.30	.35	1.00		
Prb Slv (Covariate)	.05	.20	-.18	-.15	1.00	
SES (Covariate)	.08	.06	.05	.17	.12	1.00

DSS = Developmental Sentence Scoring
MLU = Mean Length of Utterance
TTR = Type-Token Ratio
Prompts = Verbal Prompts Necessary to Elicit a Response
Prb Slv = Nonverbal Problem Solving Ability
SES = Socioeconomic Status

TABLE 3: The Intercorrelation Matrix Between the Dependent Variables With the Effects of the Covariates Removed

N = 120	DSS	MLU	TTR	Prompts
DSS	1.00			
MLU	.70	1.00		
TTR	-.20	-.33	1.00	
Prompts	-.13	-.30	.32	1.00

TABLE 4: Effect of Nonverbal Problem Solving Ability Upon the Four Dependent Measures

	df	SS	F-Ratio	p
DSS	1,74	.2502	.13	N.S.
MLU	1,74	4.5253	3.07	N.S.
TTR	1,74	.0066	2.57	N.S.
Verbal Prompts	1,74	707.6546	2.22	N.S.

TABLE 5 Effect of Socioeconomic Level Upon the Four Dependent Measures

	df	SS	F-Ratio	p
DSS	1,74	.8227	.44	N.S.
MLU	1,74	.1331	3.07	N.S.
TTR	1,74	.0009	.37	N.S.
Verbal Prompts	1,74	859.7454	2.22	N.S.

TABLE 6 Multivariate Analysis of Covariance

Dependent Variables: DSS, MLU, TTR, Prompts

Source	df	$\frac{H}{S}$	GCR	U-Statistic (Wilk's Lambda)	Approximate F-Ratio	df	p	θ
Group Membership	1	1 34.5 1	.1824	.8457	3.24	4,71	.0169	.1543
Grade	2	1 34.5 2	.1407 .0124	.8659	1.32	8,142	N.S.	
Sex	1	1 34.5 1	.2308	.8125	4.10	4,71	.0048	.1875
Ethnicity	2	.5 34.5 2	.1010 .0221	.8586	1.08	8,142	N.S.	
Group X Grade	2	.5 34.5 2	.9034 .0105	.9050	.91	8,142	N.S.	
Group X Sex	1	1 34.5 1	.0647	.9429	1.07	4,71	N.S.	
Group X Ethnicity	2	.5 34.5 2	.0243 .0110	.9655	.31	8,142	N.S.	
Grade X Sex	2	.5 34.5 2	.1463 .0355	.8425	1.59	8,142	N.S.	
Grade X Ethnicity	4	-.5 34.5 4	.1535 .0947 .0295 .0012	.7624	1.22	16,217	N.S.	
Sex X Ethnicity	1	1 34.5 1	.0306	.9703	.54	4,71	N.S.	
Group Membership X Grade X Sex	2	.5 34.5 2	.0102 .0031	.9868	.12	8,142	N.S.	
Group Membership X Grade X Ethnicity	2	.5 34.5 2	.0233 .0203	.9578	.39	8,142	N.S.	
Group Membership X Sex X Ethnicity	1	1 34.5 1	.0411	.9605	.73	4,71	N.S.	
Grade X Sex X Ethnicity	2	.5 34.5 2	.0249	.9662	.31	8,142	N.S.	

θ = Proportion of Variance Accounted for

TABLE 7 Means Analysis for the Effects of Group Membership Upon the Four Dependent Measures

Group	N	Dependent Measure
		DSS
		SD = 1.3665 sdfc = .10
Reading Disabled	58	$\bar{X}$ = 6.99
Control	45	$\bar{X}$ = 7.51
		MLU
		SD = 1.2133 sdfc = .77
Reading Disabled	58	$\bar{X}$ = 7.72
Control	45	$\bar{X}$ = 8.51
		TTR
		SD = .0508 sdfc = .65
Reading Disabled	58	$\bar{X}$ = .46
Control	45	$\bar{X}$ = .46
		Prompts
		SD = 17.8729 sdfc = -.43
Reading Disabled	58	$\bar{X}$ = 22.69
Control	45	$\bar{X}$ = 15.54

SD = Standard Deviation
sdfc = Standardized Discriminant Function Coefficient
$\bar{X}$ = Mean

TABLE 8 Means Analysis for the Effects of Sex Upon the Four Dependent Measures

Group	N	Dependent Measure
		DSS
		SD = 1.3666 sdfc = -.15
Females	50	$\bar{X}$ = 7.50
Males	53	$\bar{X}$ = 7.08
		MLU
		SD = 1.2133 sdfc = -.36
Females	50	$\bar{X}$ = 8.44
Males	53	$\bar{X}$ = 7.90
		TTR
		SD = .0508 sdfc = .83
Females	50	$\bar{X}$ = .44
Males	53	$\bar{X}$ = .48
		Prompts
		SD = 17.8729 sdfc = -.43
Females	50	$\bar{X}$ = 19.12
Males	53	$\bar{X}$ = 18.23

SD = Standard Deviation
sdfc = Standardized Discriminant Function Coefficient
$\bar{X}$ = Mean

TABLE 9 Comparison of Mean Percentage of Fourteen Parts of Speech Between the Reading Disabled and the Control Group**

	Reading Disabled Group	Control Group		
Part of Speech	Mean Percentage	Mean Percentage	T-Test	P Level
1. Noun	18.34	17.61	1.28	.204
2. Verb	15.01	16.53	-2.14	.035
3. Adjective	3.48	4.31	-2.90	.005
4. Adverb	2.65*	4.29	-5.09	.000*
5. Pronoun	18.80	19.58	-1.31	.195
6. Relative	.87	1.06	-1.14	.256
7. Article	7.44	7.06	-0.33	.742
8. Indefinite	.56	.36	2.03	.045
9. Auxiliary	7.60*	5.07	3.95	.000*
10. Quantifier	3.55	3.89	-1.10	.273
11. Preposition	8.42	8.24	.44	.662
12. Conjunction	10.74	9.42	2.06	.042
13. Interjection	.60	.95	-1.27	.210
14. Unclassified	1.70	1.52	.71	.480

*$p < .004$

**Based on the Total Number of Words Uttered

Lorna Idol-Maestas is an Assistant Professor in the Department of Special Education. She has been program coordinator for the Resource/ Consulting Teacher (R/CT) Training Program since August 1978. The R/CT program is a Master's level program designed to train certified teachers to provide direct instructional services to children with mild academic and behavioral difficulties. In addition, the program focuses on training special educators to serve as consulting teachers to regular classroom teachers.

Dr. Idol completed a Ph.D. in Special Education at the University of New Mexico in Albuquerque, New Mexico. Her major areas of study were learning disabilities and behavior disorders with a composite major in language development, neuropsychology, and statistics. She attended the University of Denver in Denver, Colorado, and received a B.S. in Education from the University of Nevada at Reno. She holds dual certification in elementary education and special education. Her Masters degree is in learning disabilities from the University of Nevada.

Prior to appointment at the University of Illinois she was a course instructor in Special Education at the University of New Mexico. She worked as a field supervisor for student teachers at the University of New Mexico and the University of Nevada. She has worked at all elementary and secondary grade levels providing direct instruction to children with learning and behavior problems. She has worked as a Master Teacher for a language acquisition program and as a counselor to children with behavior disorders. She has teaching experience with deaf children and gifted and talented children.

The topic of her dissertation research was oral language development of children with reading difficulty. This was a multivariate study

that considered the effects of socioeconomic status, sex, grade level, ethnicity, and nonverbal problem solving ability upon oral language. Reading disabled children were compared to children receiving reading instruction in regular classrooms. Significant group differences were observed. Dr. Idol is currently working on a replication study. Dr. Idol is interested in oral and written language of children with reading difficulties, direct instruction techniques, transferring learning behavior from special instructional settings to regular classrooms and multivariate statistical applications.